



1 fed.

PTO/SB/21 (02-04)

Approved for use through 07/31/2006. OMB 0651-0031  
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

## TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	10/644,361
Filing Date	August 20, 2003
First Named Inventor	Kwak et al.
Art Unit	2661
Examiner Name	Not Yet Known
Attorney Docket Number	I-2-0304.1US

Total Number of Pages in This Submission

### ENCLOSURES (Check all that apply)

<input type="checkbox"/> Fee Transmittal Form	<input type="checkbox"/> Drawing(s)	<input type="checkbox"/> After Allowance communication to Technology Center (TC)
<input type="checkbox"/> Fee Attached	<input type="checkbox"/> Licensing-related Papers	<input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences
<input type="checkbox"/> Amendment/Reply	<input type="checkbox"/> Petition	<input type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)
<input type="checkbox"/> After Final	<input type="checkbox"/> Petition to Convert to a Provisional Application	<input type="checkbox"/> Proprietary Information
<input type="checkbox"/> Affidavits/declaration(s)	<input type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address	<input type="checkbox"/> Status Letter
<input type="checkbox"/> Extension of Time Request	<input type="checkbox"/> Terminal Disclaimer	<input checked="" type="checkbox"/> Other Enclosure(s) (please identify below):
<input type="checkbox"/> Express Abandonment Request	<input type="checkbox"/> Request for Refund	Form PTO-1449, Copy of PCT Search Report and Copies of Cited References AE and AH-AL
<input checked="" type="checkbox"/> Information Disclosure Statement	<input type="checkbox"/> CD, Number of CD(s) _____	
<input type="checkbox"/> Certified Copy of Priority Document(s)	Remarks	
<input type="checkbox"/> Response to Missing Parts/Incomplete Application		
<input type="checkbox"/> Response to Missing Parts under 37 CFR 1.52 or 1.53		

### SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name	Frank A. Mazzeo	Reg. No. 46,259
Signature		
Date	5/27/04	

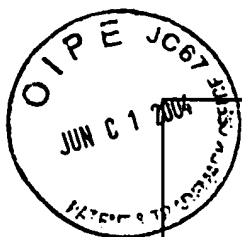
### CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below.

Typed or printed name	Frank A. Mazzeo		
Signature		Date	5/27/04

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



<b>FORM PTO-1449</b>  U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE  INFORMATION DISCLOSURE STATEMENT BY APPLICANT  (Use several sheets if necessary)	ATTY. DOCKET NO. I-2-0304.1US	SERIAL NO. 10/644,361
	APPLICANT Kwak et al.	
	FILING DATE August 20, 2003	GROUP 2661

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA	6 2 0 8 2 9 5	03/2001	Dogan et al.			
	AB	6 3 7 0 1 2 9	04/2002	Huang			
	AC	6 2 5 2 5 4 0	06/2001	Hale et al.			
	AD	6 1 4 4 7 1 1	11/2000	Raleigh et al.			

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
	AE	20 02 1 3 2 6 6	04/2002	PCT			YES	NO

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

AF	U.S. Publication No. 2003/0021335 A1, De et al., January 30, 2003.
AG	U.S. Publication No. 2003/0026325 A1, De et al., February 6, 2003.
AH	Anja Klein, Ghassan Kawas Kaleh and Paul Walter Baier, "Zero Forcing and Minimum Mean-Square-Error Equalization for Multiuser Detection in Code-Division Multiple-Access Channels," IEEE Transactions on Vehicular Technology, Vol. 45, No. 2, May 1996
AI	Anja Klein, "Data Detection Algorithms Specially Designed for the Downlink of CDMA Mobile Radio Systems," IEEE 47th Vehicular Technology Conference, Phoenix, AZ, USA, May 4-7, 1997
AJ	H.R. Karimi and N.W. Anderson, "A Novel and Efficient Solution to Block-Based Joint-Detection Using Approximate Cholesky Factorization," Motorola GSM Products Division, Swindon, UK, 1998.
AK	PA Consulting Group/Racal Instruments Ltd., "Low Cost MMSE-BLE-SD Algorithm for UTRA TDD Mode Downlink," ETSI STC SMG2 Layer 1 Expert Group, Helsinki, Finland, 8-11th Sept. 1998.
AL	Anja Klein and Paul W. Baier, "Linear Unbiased Data Estimation in Mobile Radio Systems Applying CDMA," IEEE Journal on Selected Areas in Communications, Vol. 11, No. 7, Sept. 1993.

EXAMINER	DATE CONSIDERED
----------	-----------------

EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference I-2-0304.1WO	<b>FOR FURTHER ACTION</b>	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
International application No. PCT/US03/25555	International filing date ( <i>day/month/year</i> ) 15 August 2003 (15.08.2003)	(Earliest) Priority Date ( <i>day/month/year</i> ) 20 August 2002 (20.08.2002)
Applicant INTERDIGITAL TECHNOLOGY CORPORATION		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

**1. Basis of the Report**

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:



contained in the international application in written form.



filed together with the international application in computer readable form.



furnished subsequently to this Authority in written form.



furnished subsequently to this Authority in computer readable form.



the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.



the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (See Box II).

4. With regard to the title,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

5. With regard to the abstract,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No. 10



as suggested by the applicant.



because the applicant failed to suggest a figure.



because this figure better characterizes the invention.



None of the figures

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/25555

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G06F 15/00

US CL : 702/196, 340/14.1, 708/520

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 702/196, 340/14.1, 708/520

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2003/0021335 A1 (DE et al) 2003 January 30 (30.01.2003), figures 4, 5, paragraphs 37-76	1-59
Y	US 2003/0026325 A1 (DE et al) 2003 Feb. 06 (06.02.2003), figures 4, 5, paragraphs 37-86	1-59

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent published on or after the international filing date

"I" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

14 April 2004 (14.04.2004)

Date of mailing of the international search report

27 APR 2004

Name and mailing address of the ISA/US

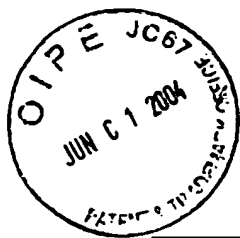
Mail Stop PCT, Attn: ISA/US  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

Facsimile No. (703)305-3230

Authorized officer

Mohammad H. Ghayour

Telephone No. (703) 305-4700



**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In the **PATENT APPLICATION** of:

**Kwak et al.**

**Our File: I-2-0304.1US**

**Application No.: 10/644,361**

**Date: May 27, 2004**

**Confirmation No.: 6406**

**Filed: August 20, 2003**

**For: EFFICIENT JOINT DETECTION**

**Group: 2661**

**Examiner: Not Yet Known**

**INFORMATION DISCLOSURE STATEMENT**

Mail Stop Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Further to Applicants' Duty of Disclosure pursuant to 37 C.F.R. §1.56, Applicants wish to bring to the Examiner's attention the material cited on the enclosed PTO-1449 form. References AF and AG were cited in a search report in a counterpart international application. A copy of the search report is enclosed.

Pursuant to 37 C.F.R. §1.98, copies of the cited U.S. patents and publications are not provided. Copies of the cited references AE and AH-AL are enclosed.

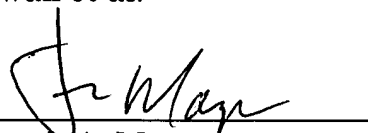
**Applicant:** Kwak et al.  
**Application No.:** 10/644,361

It is respectfully requested that the Examiner consider these documents and return an initialed copy of the Form PTO-1449 indicating consideration of the cited materials.

Respectfully submitted,

Kwak et al.

By



Frank A. Mazzeo  
Registration No. 46,259  
(215) 568-6400

Volpe and Koenig, P.C.  
United Plaza, Suite 1600  
30 South 17th Street  
Philadelphia, PA 19103

FAM/sag  
Enclosure